



EFFECT OF COCOYAM VALUE ADDITION ON THE LIVELIHOOD OF RURAL WOMEN PROCESSORS/MARKETERS IN ISIALA NGWA LOCAL GOVERNMENT AREA OF ABIA STATE, NIGERIA

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Abstract

The study analysed the effect cocoyam value addition on the livelihood of cocoyam rural women marketers/processors in Isiala Ngwa North Local Government Area of Abia State, Nigeria. One hundred and twenty cocoyam processors/marketers were randomly selected with the use of a multi-stage sampling procedure for the study. Results showed that majority (65%) of the respondents were young, 58% of them were married, while 98% were literate. Rural marketers/processors in the study area mainly processed cocoyam into flour, fufu and crisps. The processors sourced their cocoyam cormels from the farm gate, wholesalers, retailers and owned farms. The study showed that labour and cocoyam cormels were the most expensive cost items in cocoyam processing, while the depreciation cost was the least. However, the result of the rate of returns on investment shows that cocoyam processing is an income earning venture. The result further indicates that processing cocoyam into flour is more rewarding since its returns on investment (0.22k) is higher for flour compared to fufu (0.19k) and cocoyam crisps (0.21k) for every one naira invested. Labour cost, cost of processing equipment, cost of cocoyam cormels, credit access, income and household size were the significant variables influencing cocoyam value addition. However, age, household size, marketing/processing experience, quantity of cormels bought, selling price, and cocoyam value addition were the significant factors affecting the profit level and hence the income of the cocoyam processors. The result further showed that cocoyam value addition had a positive effect on the income/livelihood of the cocoyam farmers. The study recommends that processors/marketers have access to storage facilities to ensure that by-products processed in excess quantities are stored in order to make them available throughout the year at affordable prices. Efforts should also be made to ensure that the marketers/processors be provided with the necessary resources and facilities/equipment to ensure enhanced processing/marketing of cocoyam by-products.

Keywords: Cocoyam, Value addition, Livelihood, Processing, and Women

Introduction

Cocoyam is undoubtedly an important food crop across many Sub-Saharan African countries, particularly in Nigeria, Ghana and Cameroon. It is the third important staple root/tuber crop after yam and cassava in Nigeria, and provides a cheaper substitute to yam, especially during periods of food scarcity (Utomakili and Agunbiade, 2013). Cocoyam (both *Xanthosoma* spp and *Colocasia* spp) belong to the family *Araceae*. Cocoyam is one of the major five tuber crops produced in Nigeria for local consumption. It has become a traditional crop in Southern Nigeria since its introduction in 100.A.D. It perfectly adapts to varying farming systems in Nigeria. Nigeria is the world's largest producer of cocoyam with an estimate of 31.04%

of the world's total production (FAO, 2018), while South Eastern States of Nigeria produce about 56% of Nigeria's total production (Agbelemoge, 2013).

Cocoyam is a prime mover of socioeconomic development, and activities in most rural women households where it is produced for food and or market (Okoye and Okoye, 2014). In the south-east and south-south regions of Nigeria, cocoyam production, marketing and consumption are an interwoven enterprise among rural dwellers. The livelihood of rural dwellers in these regions revolves greatly around women, investing their resources in cocoyam production, and sale in local markets. Incomes generated from these activities are channeled into

meeting various family needs (Okoye, 2006).

Cocoyam in recent years appear neglected and underutilized when compared with other food crops, but they still maintain important economic values in several Nigerian households, where they are produced and processed with different values like, corms and cormels, pellets for feed meal, flour, crude protein (Olayide and Heady, 2008). The cocoyam rebirth for food security and empowerment programme of the National Root Crops Research Institute (NRCRI), Umudike have identified various value-added products of cocoyam to include; cocoyam crisps, high quality flour for confectionaries, soup thickener, cocoyam fufu flour, achicha, chin chin, cocoyam queen cake, doughnut and chips. The value addition will increase consumption by different categories of people, increase production and reduce spoilage in storage (Chukwu *et al.*, 2015). About 97% of respondents in a research conducted in Southwest Nigeria indicated cocoyam as part of their family menu (Agbelemoge, 2013). Apart from human consumption, cocoyam corms can be utilized as feed for animals (Apata and Babalola, 2012).

One major factor affecting value addition in cocoyam processing is the preference for production and consumption of other crops which has led to its neglect and under-utilization (Utomakili and Agunbiade, (2013). In addition, Okorji *et al.* (2013) posited that good processing, preservation and value addition technologies are not within the reach of rural women which hinder effective value addition of cocoyam. Furthermore, cocoyam is a perishable and bulky product, which makes it very expensive to transport without some initial processing and consequent value addition (Aniedu and Aniedu, 2015; NRCRI, 2015). As a result of the low value addition of cocoyam, it commands low price in the market. The low price reduces the profitability and livelihood of cocoyam women farmers. There are very few empirical studies that have investigated the effect of cocoyam value addition on the livelihood of rural women. This has added to the waning popularity of cocoyam production, because its true income potential has not been adequately investigated. This paper therefore sought to investigate the effect of value addition on the livelihood of rural women farmers in Isiala Ngwa North Local Government Area of Abia State.

Methodology

Study area

The study was conducted in Isiala Ngwa North LGA of Abia State, Nigeria. Isiala Ngwa LGA is one of the LGAs in Umuahia Agricultural Zone. The LGA is also located within the Abia Central Senatorial Zone and lies between longitudes 7° 23' and 8° 02' East of Greenwich meridian and latitude 5° 23' and 5° 30' North of the Equator. Isiala Ngwa North LGA is located midway between Aba and Umuhia. There are 52 communities in Isiala Ngwa North, which comprises 7 Zones. These consist of Nkwa Ukwu, Ama Asaa Nsulu, Umuohia, Ihie, Amasa Ntigha, Amapu Nitigha and Nsulu. The

LGA has distinct wet and dry seasons which characterize its humid tropical climate, with the dry season extending from November to March. It is low-lying with a heavy rain fall of about 2400mm/year, especially intense between the months of April through October with relative humidity that is good for cocoyam production. The LGA has a population of about 195,622 people who are predominantly rural processors/marketers, with a relatively high density of 395 persons per square kilometer (NBS, 2014). Agriculture is the dominant economic activity, and main source of employment in the area, providing employment and income for more than 76 percent of the population. The people are predominantly processors/marketers and have the potential for the production of agricultural produce and products such as cocoyam, yam, plantain, pineapple, garden egg, pepper, and palm fruit. The processors/marketers also rear livestock, such as sheep, goat, pig and poultry.

Sampling Procedure

A multi-stage and purposive random sampling technique were used in this study. Four communities were randomly selected in the first stage. In the second stage, three villages were also randomly selected from each of the autonomous communities. In the third stage, ten cocoyam women processors/marketers were purposively selected from each of the selected villages based on their level of experience and intensity of engagement in cocoyam value addition, giving a total of one hundred and twenty (120) respondents.

Data Collection

Primary data were used for the study. Data were collected with the use of well-structured questionnaires. Data on the processors/marketers' socio-economic characteristics, cost of cocoyam value addition, among others were collected.

Methods of Data Analysis

Descriptive, net return and inferential statistics were used for analyses

Net Return

The estimation of the net returns was computed thus:

$$NR = TR - TC \dots\dots\dots (1)$$

NR = Net Return (profit)

TR = Total Revenue

TC = Total Cost

The capital inputs were depreciated using the straight line method. The revenue generated through sale of cocoyam value added products was estimated. The difference between the revenue generated and cost incurred were calculated.

Multiple Regression

The determinants of cocoyam value addition is expressed thus:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8) + e \dots\dots\dots (2)$$

Where,

Y = Value addition (N)

X₁ = Labour cost (N)

X₂ = Depreciated cost of equipment (N)

X_3 = Processing experience (Years)
 X_4 = Income (N)
 X_5 = Coop membership (1 = membership, 0 = non-member)
 X_6 = Credit amount (N)
 X_7 = Household size (number of persons)
 X_8 = Cost of cocoyam cormels (N)
 e = Error term

The determinants of income for value added cocoyam is expressed thus:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9) + e \dots\dots\dots(3)$$

Where:

Y = Income (N)
 X_1 = Age (Years)
 X_2 = Educational level (years)
 X_3 = Household size (number of persons)
 X_4 = Marketing/processing experience (years)

X_5 = Quantity bought (N)
 X_6 = Cost of tubers (N)
 X_7 = Selling price (N)
 X_8 = Cost of transportation (N)
 X_9 = Cocoyam value addition (N)

The four functional forms of linear, exponential, cob-douglas and semi-log were estimated and the lead equation chosen based on the value of R^2 (coefficient of the multiple determination), F-value and the conformity of the signs with *a priori* expectation.

Socio Economic Characteristics of Cocoyam Women Processors/Marketers

The socio-economic characteristics of the respondents considered are presented in Table 1.

Table 1 Distribution of Cocoyam women processors/marketers based on their Socio-economic Characteristics

Variables	Frequency	Percentage (%)
Age (Years)		
11 - 20	8	7
21 - 30	14	12
31 - 40	42	35
41 - 50	40	33
51 - 60	16	13
Mean: 44		
Marital status		
Single	30	25
Married	70	58
Widowed	14	12
Divorced	6	5
Household size		
1-5	60	50
6-10	50	42
11 -15	10	8
Mean: 6		
Educational level		
Primary	10	8
Secondary	60	50
Tertiary	48	40
No formal education	1	2
Processing/Marketing experience (Years)		
11 - 20	14	7
21 - 30	42	35
31 - 40	40	33
41 - 50	16	12
51 - 60	8	7
*Common cocoyam products identified		
Cocoyam flour	96	80
Cocoyam fufu	120	100
Cocoyam crips	57	95
Total	120	100.00

*= multiple responses recorded

Source: field Survey Data, 2019

Table 1 shows that only 8% of the respondents were within the age range of 11-20, 12% were within the age of 21-30 years, whereas 35%, 33% and 13% were within the age range of 31-40 years, 41-50 years; and 51-60 years respectively. Result also shows that the mean age of the processors/marketers is 44 years. This is an indication that the respondents in the study area were mostly middle aged. This also implies that they were still at their youthful age, more energetic, and flexible to cope with risks and uncertainties that characterize processing and marketing activities. Iheke (2010) and Iheke and Nwaru (2014), noted that the risk bearing abilities and innovativeness of a farmer, his mental capacity to cope with the daily challenges and demands of farm production activities and his ability to do manual work decrease with advancing age. About 58% of the respondents were married, with 25% single. Also 12% and 5% were widowed and divorced respectively. This implies that the married ones were more involved in this activity. This is an indication of support from their spouses and children in carrying out cocoyam processing and marketing activities. It is not surprising that this is the case, because married individuals are more likely to engage in economic activities as better resource managers. They may also be able to reduce the cost of labour by deciding to use members of the households as source of family labour for the value addition activities. Results show that 50% of the respondents have household sizes of between 1-5 members, while 42% and 8% have between 6-10, and 11-15 persons respectively, with mean household size of 6 persons. This result implies that these respondents have moderate family sizes. This has implications on labour supply to the enterprise. The Educational level of the respondents in the study area reveals that many (50%) respondents attained secondary level of education, 40% and 8% attained tertiary and primary levels respectively, while only 2% had no form of formal education. This implies that, 98% of the women in the study area were literate with diverse formal educational levels ranging from primary to tertiary level. Literacy (ability to read and write) would enable the processors/marketers to better utilize effectively and efficiently available resources in the area for businesses and curtail frivolous spending. As expected, higher education would enhance improved business ideas, marketing skills, innovation and managerial ability for business sustainability. This result is in agreement with Ebe *et al.* (2016), Nwibo and Okorie (2013), that as an individual increases his educational attainment, his managerial ability for business sustainability also increases. Table 1 also shows that only 8% of the respondents had processing/marketing experience range of 11-20 years, 12% with 21-30 years, whereas, 35%, 33% and 13% were within the experience range of 31-40 years, 41-50 years, and above 50 years respectively. Processing/marketing experience is very important as it provides them with efficient market information. Cocoyam by-products sellers need information about the business cycle, where and when to buy the product, when to store the product and an

appropriate time to sell. This is substantiated by the findings of Akanu and Ibama (2012), who observed that marketing experience is important in determining the profit levels of marketers, the more the experience, the more the marketers understand the marketing system, condition, trends, and prices. Results show that 80% and 120% of the cocoyam processors/marketers identified cocoyam flour and cocoyam fufu as their major cocoyam value added products, while 95% of them indicated that cocoyam crisps was the major value added product of cocoyam in the study area. These cocoyam value-added were the three major and most important value added products of cocoyam in the study area and so were used for the study

Cost, Returns and Profit of Cocoyam Value-Added Products in the Study Area

The net returns on the cocoyam value added products are presented in Table 2. Returns per naira invested in the cocoyam products were evaluated by computing the rate of investment for each of the processed cocoyam product that was processed and marketed by the women cocoyam processors/marketers to estimate the income. This was divided by the total cost. The item associated with the variable cost of the enterprise includes; cost of fresh cormels, cost of transportation. The straight line method was used in calculating the depreciated values of the fixed assets (equipment) used. The rate of returns per Naira invested in processing N45,000 worth of cocoyam cormels (1,500kg) to the products is presented in Table 2. The result shows that 500kg of cocoyam cormels used to produce flour costs about N 15,000 at average price of N30/kg. The labour cost and the depreciation of equipment used was N1, 200.00 and N1,020.00 respectively, giving a total cost of N20, 570.00 in addition to other costs items for processing cocoyam cormels into *flour*. The total revenue was N25,000.00 with a gross margin of N5, 450.00 and net margin of N4,430. 00. For the processing of cocoyam cormels into cocoyam fufu, N15,000 (500kg) worth of cocoyam cormels was processed at an average price of N30/kg, with the labour cost of N1,800 and depreciation on equipment used a tN1,020. The total cost incurred by the processors was N20,170 with total revenue of N24,000, gross margin of N4,850 and net income of 3,830. On the other hand, to process cocoyam cormels into flour, the table showed that N15,000 (500kg) worth of cocoyam cormels was used to produce cocoyam crisps at an average price of N30/kg. The women incurred a depreciation of N1,020 on equipment. The total cost of processing was N19,020, with gross margin and net margin of N4,000 and N2,980 respectively. The study revealed that labour and cocoyam cormels were the most important cost items in cocoyam processing, while the depreciation cost was the least. However, the result of the rate of returns on investment shows that cocoyam processing is an income earning venture. The return per naira of investment on the processing of N15,000 worth of cocoyam cormels into different products gave N0.22 for flour, N0.19 for cocoyam fufu and N0.21 for cocoyam crisps. This implied that for every N 1 invested in flour, fufu and crisps processing,

it yielded the sum of N0.22k, N0.19k and N0.21k respectively. The result further indicates that processing cocoyam cormels into flour is more rewarding since the

return on investment is higher for flour compared to fufu and crisps.

Table 2: Average costs, Returns and profit of Cocoyam value-added among marketers in the study area

Items	Average unit price((N)	Quantity	Total Value (N)
A Returns From Sales			
Flour	100	250kg	25,000
Cocoyam fufu	80	300kg	24,000
Cocoyam crisps	100	220kg	22,000
Variable Costs			
Cocoyam cormels			
Flour	30	500kg	15,000
Cocoyam fufu	30	500kg	15,000
Cocoyam crisps	30	500kg	15,000
Labour for processing			
Flour	1,200	1manday	1,200
Cocoyam fufu	1,200	1.5mandays	1,800
Cocoyam crisps	1,200	0.75manday	900
Transportation			
Flour			500
Cocoyam fufu			500
Cocoyam crisps			250
Cost of market space			1,050 each
Cost of storage facilities			800 each
B Total Variable Cost			
Flour			19,550
Cocoyam fufu			19,150
Cocoyam crisps			18,000
Fixed Cost			
Depreciation on fixed asset			
			1,020 each
C Total Fixed Cost			
Flour			1,020
Cocoyam fufu			1,020
Cocoyam crisps			1,020
D Total Cost			
Flour			20,570
Cocoyam fufu			20,170
Cocoyam crisps			19,020
E Net income = (A-D)			
Flour			4,430
Cocoyam fufu			3,830
Cocoyam crisps			2,980
F Gross Margin (A-B)			
Flour			5,450
Cocoyam fufu			4,850
Cocoyam crisps			4,000
G Return of Investment(ROI)= (E/D)			
Flour			0.22
Cocoyam fufu			0.19
Cocoyam crisps			0.21

Source: Field survey Data, 2019

Factors Influencing Cocoyam Value Addition in the Study Area

Table 3 shows the linear regression estimates of the factors that influence cocoyam value addition in Isiala Ngwa North Local Government Area of Abia State.

Table 3: Regression Estimates of the Determinants of Cocoyam value added in the Study Area

Variables	coefficients	Std. error	t-value	p-value
Constant	494.3584	984.5446	0.50	0.617
Labour cost (X ₁)	1.146127***	.1080013	10.61	0.000
Depreciated cost of equipment (X ₂)	9969249***	.158209	6.30	0.000
Processing experience (X ₃)	9.238559	16.9348	0.55	0.587
Income (X ₄)	1.50918***	0.3006	5.02	0.008
Coop membership (X ₅)	27.82481	280.1595	0.10	0.921
Credit access (X ₆)	1.382555***	0.2367	5.84	0.000
Household size (X ₇)	0.1452402***	0.0473	3.07	0.941
Cost of cocoyam cormels (X ₈)	10.5281***	.3960907	26.58	0.000
R ²	0.9737			
F-value.	142.233***			

Source: Field Survey, 2019. *** Significant at 1%

The results linear form was selected and presented based on a high R² value, number of significant factors and agreement with *a priori* expectations. The R² value of 0.9737 indicates a 97.4% variability in total value added jointly explained by the explanatory variables while the remaining 2.6% was explained by variables not included in the model. The high significance of F-value confirms the appropriateness of the coefficients of the independent variables in the estimated model. The result shows that the coefficients of cost of labour (X₁), depreciated cost of equipment (X₂), and cost of cocoyam cormels (X₈) are directly related to value added and significant at 1% level each. The coefficient of labour indicates that if labour cost is increased by ₦1, value added to cocoyam cormels increases by ₦1.15. Also, the coefficient of depreciated cost of processing equipment shows that if the cost expended on processing equipment increases by ₦1, value added to cocoyam increases by approximately ₦1. Furthermore, if the cost of cocoyam cormel processed is increased by N1, value added to cocoyam cormels is increased by N10.52. The positive relationship between cost of labour and value added brings up two issues; processors are open to opportunity to increase value added to cocoyam by engaging available household labour to reduce labour cost or hire more quality labour which will increase cost. However, the former option will place a limit on achieving an increased scale of operation. The respondents' income (X₄) was positively signed as expected. This agrees with the findings of Ekwe *et al.* (2009), that income is positively related to value addition implying that income encourages value addition. On the other hand, increase in value addition could result in increase in accruable income and thus improvement in the rural women livelihood. The cocoyam processors' access to credit (X₆) gave was positive and was highly significant at 1% level, indicating that an increase in access to credit would increase cocoyam value addition. The sign identity of this variable makes sense for this study and conforms to *a priori* expectation. Access to credit has been identified as an important factor in farm business and useful in funding transaction cost for on and off farm wage activities (Ibrahim and Srinivasan, 2013). It is also regarded as one of the key elements in raising productivity and income and hence, improvement in livelihood (DBSA, 2005). An Increase in the adult

equivalent household size would increase cocoyam value addition. This is in agreement with *a priori* expectation. Increase in household size has implication on farm labour supply which minimizes the amount spent on hired labour, and as well maximizes profit derivable from value addition

Effect of Cocoyam Value Addition and other Factors on the Income/Livelihood of the Cocoyam Processors (Processors/Marketers) in the Study Area

Table 4 shows the effect of value addition and other variables on the income/livelihood of the cocoyam processors/marketers in the study area. The Double-log form was chosen as the lead equation based on a high R² (0.889) value, and conformity with *a priori* expectations. The R² value of 0.889 implies that 88.9.5% of the total variations in profit were accounted for by the dependent variables. Result of the analysis revealed that marketing experience had a positive relationship with the profit/income of the cocoyam processors/marketers and significant at 5% level. This is as expected because, marketing experience is very important as it provides the seller with efficient market information. Marketers need information about the business cycle, where and when to buy the product, when to store the product and an appropriate time to sell. This is substantiated by the findings of Offor *et al.* (2017) who observed that marketing experience is important in determining the profit levels of marketers, the more the experience, the more the marketers understand the marketing system, condition, and trends. The quantity of cocoyam value added products sold had a positive relationship with marketing profit/income and significant at 1% level. This is because the higher the selling price, the more it adds to the income of the cocoyam processors in the study area. This finding is in line with *a priori* expectation. In this vein the women are encouraged to continue to add value to cocoyam given the benefits accruing to it. On the other hand, the coefficient of transportation cost was negatively signed and significant at 5% level. This equally conforms to a

priori expectation because increase in transportation cost will reduce the profit and level of income of the processors. According to Olatunde (2013), high transportation cost account for about 41.4% of total marketing cost. The coefficients of age, and cost of cormels were negatively signed and significant at 1%

level each, and household size at 10% level, implying that a unit increase in each of age, household size and purchasing price of cormels would result in a corresponding 5.1, 1.0 and 2.1 unit decrease respectively in respondent's net returns/profit.

Table 4: Determinants of net income (profit) of cocoyam processors/marketers in Isialangwa North Local Government Area of Abia State

Variable	Linear	Exponential	+Double log	Semi log
Constant	6264.16*** (7.13)	10.422*** (31.878)	1.245 (0.39)	23.22 (0.415)
Age(X ₁)	-10111.23 (-0.973)	-0.002 (-0.025)	-5.105*** (-3.796)	0.944*** (13.937)
Educational level(X ₂)	23.158 (0.412)	0.986 (0.211)	-0.66 (-0.548)	-754.25 (-0.25)
Household size(X ₃)	1417.577** (2.319)	5.933E-8** (6.433)	-1.030* (-1.675)	-0.506** (-2.340)
Marketing/processing experience(X ₄)	-3073.193 (-1.581)	0.003 (1.349)	0.223** (2.082)	-0.122** (-3.060)
Quantity bought(X ₅)	100.218*** (4.316)	4.391E-5 (0.118)	0.237** (2.099)	2.798 (0.284)
Cost of cormels (X ₆)	0.750*** (5.368)	0.298 (0.121)	-0.214 ** (-2.111)	0.2212 (0.400)
Selling price(X ₇)	2.652* (0.658)	8621.552*** (26.12)	0.747*** (6.719)	0.350*** (3.288)
Cost of transportation (X ₈)	424.422 (1.262)	0.0111 (0.376)	-2.010** (-3.075)	-0.009 (-1.01)
Cocoyam value addition (X ₉)	1.234 (0.445)	14.44*** (3.547)	0.5548*** (3.117)	6.594* (1.628)
R ²	0.861	0.871	0.889	0.726
R ⁻²	0.817	0.829	0.854	0.639
F-ratio	19.507***	25.207***	21.146***	8.328***

Source: Field survey data, 2019

***, **, * is significant at 1%, 5% and 10% level. + = lead equation. Figures in parenthesis are t-ratios

Conclusion

From the results of this study, it is concluded that cocoyam value addition has positive effect on the livelihood of rural women in Isiala Ngwa North Local Government area of Abia State, Nigeria given the positive net returns generated from the different value added products processed from cocoyam. Labour cost, cost of processing equipment, cost of cocoyam cormels, credit access, income and household size were important determinants of cocoyam value addition. Important determinants of profit from value addition include: age, household size, processing/marketing experience, quantity bought, purchasing price of cormels, selling price, cost of transportation and cocoyam value addition. The findings therefore call policies aimed at provision of storage facilities to ensure that by-products processed in excess quantities are stored in order to make it available throughout the year at affordable prices. There is need to sensitize the processors/marketers (males and females) on the benefits that can be derived from processing and marketing of cocoyam value added products. Efforts therefore should be made to ensure that the women processors/marketers be provided with the necessary

resources and facilities to ensure enhanced processing/marketing of cocoyam value added products. Since cocoyam value addition had significant effect on women income/livelihood, there is need to empower the women through provision of trainings, workshops and seminars to update their basic skills in cocoyam value addition.

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